Managing in Conflict: How Actors Distribute Conflict in an Industrial Network

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Research Highlights

- The behavioral tradition draws attention to conflicts of interest, connected with relationships and resources

- Social psychology emphasizes conflict as experienced, involving actors' affect and emotion as well as cognition

- In IMP research, conflict threatens relationships, which combine interests, resources and managerial activity in networks

- In the setting of oilfield services, actors are embedded in durable relationships, with relationship-ending being rare

- Actors manage in conflict by adapting some tasks and processes, expanding the network to reconfigure resources

Abstract

IMP researchers have examined conflict as a threat to established business relationships and commercial exchanges, drawing on theories and concepts developed in organization studies. We examine cases of conflict in relationships from the oil and gas industry's service sector, focusing on conflicts of interest and resources, and conflict as experienced by actors. Through a comparative case study design, we propose and explanation of how actors manage conflict and manage in conflict given that they tend to value and maintain relationships beyond episodes of exchange. We consider conflicts in relationships from a network perspective, showing that actors experienced these while adapting to changes in their business setting, modifying their roles in that network. By identifying conflict with the organizing forms of relationship and network, we show how actors formulate conflict through pursuing and combining a number of strategies, distributing the conflict across an enlarged network.

Key words: Conflict, relationship, interaction, resource, chemistry, oil and gas industry

1. Introduction

Research into conflict is long-standing in organization studies, addressing its structural qualities, be these inter- or intra-organizational, its outcomes, and strategic behaviors that may secure favorable outcomes (March & Simon, 1958; Cyert & March, 1963; Thompson, 1967; Pondy, 1967; Deutsch, 1977; Jehn & Mannix, 2001; Thomas, 1992). Researchers in marketing have followed organization studies in examining conflicts in supply chains and marketing channels (Ehie, 2010; Plank & Newell, 2007; Plank, Newell & Reid, 2006; Lam & Chin, 2005; Ford, Walker & Churchill, 1975; Welch & Wilkinson, 2005). Marketing researchers have assessed the conditions under which conflicts are likely to emerge, whether conflicts exhibit stable properties such as being functional or dysfunctional, and how conflicts can be managed efficiently through contractual or other negotiated incentives (Chang & Gotcher, 2010; Cheng & Shue, 2012; Ndubisi, 2011; Webb & Lambe, 2007).

We draw on March's definition of conflict (1999, p. 217), as a fundamental problem of organizing business activities, emerging as: 'multiple nested actors confronting multiple nested time perspectives with references and identities that are inconsistent across individuals and across time'. We revisit the behavioral approaches to organization (eg., March & Simon, 1958, Cyert & March, 1963; March, 1999, 2008) as these examine conflict among actors' interests as a pervasive condition of organization. We contrast this with social-psychological analyses of conflicts as experienced by actors, typically working on specific tasks in small groups (Jehn, 1997; Jehn & Mannix, 2001; Greer, Jehn & Mannix, 2008). Without being decisively functional or dysfunctional, conflict can threaten to destabilize a relationship and we expect actors to manage conflict adaptively in order to re-stabilize their relationships

and maintain their value (March, 2010). However, there is something of a gap between research focused on how conflict is a pervasive feature of organizing, and how actors come to experience and manage particular episodes of conflict.

We address this gap by examining conflicts from the perspectives of relationships and resources as well personal interactions. IMP researchers' work on conflict is often from the perspective of managing and possibly ending relationships (Halinen & Tähtinen, 2002; Vaaland & Håkansson, 2003; Harrison, 2004; Mele, 2011; Ryan & Blois, 2010; Tähtinen & Blois, 2011). This approach can form the basis of further contributions by drawing on understandings of resource interactions and relationships (Håkansson & Waluszewski, 2002; Baraldi, Gressetvold & Harrison, 2012). The potential also exists for further contributions drawing on understandings of conflict being pervasive, possibly chronic within, but non-critical to, the continuation of relationships (Axelsson & Easton, 1992; Håkansson & Snehota, 1989, 1995; Håkansson & Johanson, 1992; Harrison & Prenkert, 2009).

We address the problem of how actors manage conflict and 'manage in conflict'[1] within business relationships as a pervasive condition and as events that they experience. Three questions guide our investigation:

1. How do actors draw resources into their relationships and interactions during conflict?

2. How do actors experience and make sense of conflict as part of their business activities?

[1] We thank one of the anonymous reviewers for suggesting this very apt phrase.

3. How do actors manage conflict in relationships?

We analyze five cases of conflict drawn from the international oil and gas industry's service sector. We focus on the supply of oilfield chemistry, which is a mature sector delivering products and services to oil companies to secure asset integrity and flow assurance across production facilities. We find conflict in these cases to be less dramatic than considered by researchers to date, with actors showing a capacity to 'manage in' conflict including by distributing conflicts functionally in a network. Actors understand conflict as being pervasive, experience and cope with conflict, have prominent concerns as to a relationship's durability, performance and value, but without the immediate concern of conflicts leading to relationships ending or requiring substantial efforts at recovery.

2. Organizing Conflicts in Business Markets

2.1 Theoretical Perspectives

Conflict threaten fruitful business exchanges and relationships, being a kind of interaction that have functional and dysfunctional effects, with its events being more or less frequent (Song, Dyer & Thieme, 2006). Two approaches are prominent in organizational research - behavioral and socio-psychological - and both have had some influence on business-to-business research.

2.1.1 The behavioral approach

The key principles of the behavioral approach are that 'decisions are intendedly rational but bounded by human and institutional limitations, that organizations

accumulate and use slack, that attention is a scarce resource, that firms satisfice with respect to aspiration levels, that firms adjust expectations and aspirations over tie with respect to experience, and that firms can be seen as coalitions of individuals and groups with conflicting goals' (Augier & March, 2008, p. 2). Furthermore, 'the firm is an adaptive political coalition, a coalition between different individuals and groups of individuals in the firm, each having different goals and hence possibly in conflict' (ibid., p. 3). March's (1999, p. 217) definition as 'multiple nested actors confronting multiple nested time perspectives with references and identities that are inconsistent across individuals and across time' is notable in that: conflict is pervasive condition of organizing; involves actors identified with interests in different combinations, including between organizations; and refers to actors' multiple perspectives, identities and time frames, so can include, for example, organizations, groups, relationships and professions. Conflicts are pervasive as these draw from actors' interests, and by referring to time frames, indicates other durable entities, consistent with resources and relationships. These principles provide the basis for our first research question, of actors drawing on resources and relationships in conflict.

March and Simon (1958, p. 132) argue that conflict emerges as 'a breakdown in the standard mechanisms of decision-making so that an individual or group experiences difficulty in selecting an action or alternative'. For Cyert and March (1963, p. 31), 'individual participants in the organization may have substantially different preference orderings', such that there is 'obvious potential for internal goal conflict inherent in a coalition of diverse individuals and groups'. Cyert and March propose that 'most

organizations most of the time exist and thrive with considerable latent conflict of goals' (p. 164), to the extent that 'procedures for "resolving" such conflict do not reduce all goals to a common dimension or even make them obviously internally consistent' (ibid.). Furthermore, Cyert and March argue that firms 'ameliorate conflict by accumulating resources (organizational slack), by decentralizing information, and by attending sequentially to crises' (ibid., p. 179). The accumulated resources are crucial, providing some slack by which adaptations to normal processes can be proposed, trialed, evaluated and made operational.

As the behavioral approach has matured, so a greater dynamism has emerged within it. Thompson (1967) argues that coalitions are formed under conditions of conflict and high aspirations (ibid., p. 126), with conflict being endemic as a process not an entity (ibid., p, 138). For Nelson and Winter (1982, p. 110) conflict can be detected within an organization's routines, which can embody truces to previous conflicts deemed resolved, or in symbiotic relation to continuing conflict. The truces can be powerful responses to conflict, stultifying otherwise potentially beneficial consequences as organizational development and innovation (ibid., p. 111). Cyert and March (1992, p. 215) discuss unresolved conflict, and the continual negotiation of the relation between the interests of an organization, its subgroups and individuals, such that 'consistency is rarely achieved and difficult to sustain'. March (1999) extends the argument across the preferences and identities of organizations, groups and individuals, and with respect to time periods within broader interactive settings, which he describes as 'ecological networks' (ibid., p. 46).

Seen systemically, organizations typically require adaptation, of 'modifying beliefs and behaviors by observing their own and others' experiences, possibly making inferences about the cause of those experiences, but in any event adjusting propensities to favor the replication of actions and beliefs that have been associated with favorable outcomes in the past' (March, 2008, p. 6). We expect this to be so when the normal ways of living with conflict break down. March (1999, p. 117; 2010, p. 75) argues that adaptation requires a balance between exploitation of known processes and exploration, experimentation and novelty, and implies a bias towards exploitation, as argued by Nelson and Winter (1982). The behavioral approach influences our second and third research questions, suggesting ways in which actors can experience and make sense of conflict, showing that conflict is a question for and of management.

2.1.2 Socio-psychological approaches

Jehn (1997) and Jehn and Mannix (2001) develop studies of conflict in teams and groups within organizations, arguing that these can be 'hotbeds of conflict' (ibid., p. 238). Beginning with Boulding's (1963) definition of 'an awareness on the part of the parties involved of discrepancies, incompatible wishes, or irreconcilable desires' they develop a three-fold categorizing of conflict as relational, task and process (Jehn & Mannix, op cit.). People experience conflict as inter-personal and affective, in tasks so around cognitive differences about ideas and opinions but 'void of the intense interpersonal negative emotions', and in processes about how to organize and provide resources for tasks (ibid, pp. 238-239). The conflicts emerge within small groups and teams, and cover questions of affect – personal and emotional conflicts –

and cognition – performing tasks and designing processes to support and manage tasks within groups (Jehn, 1997; Jehn, Greer, Levine & Szulanski, 2008).

Jehn and Mannix's typology has a clear bearing on our second research question, as to ways in which actors may experience conflict. Greer, Jehn and Mannix (2008) find from their simulations in small-groups that the conflict types interact over time. Similarly, Jehn, et al. (2008) recognize that conflicts have functional and dysfunctional effects concurrently on the performance of teams. They propose managerial involvements to reduce negative emotions across personal relationships, increasing abilities to resolve conflicts as tasks, and encourage open norms in resolving conflicts of tasks and processes (ibid., p. 492). These findings overlap with our third research question, but require careful interpretation as the research is from the perspective of dynamics and interactions within small groups and teams rather than business relationships that cross group and organizational boundaries.

2.1.3 Reconciling the behavioral and socio-psychological approaches

The definitions of March (1999) and Jehn and Mannix (2001) have much in common in the combination of affective and cognitive ways of deciding upon plans of action in conflict. They differ in the extent to which they envisage actors' perceptions capturing and mobilizing conflict and shaping its consequences for an organization or smaller group. Where the behavioral theorists cover the conditions of conflict beyond the individual or groups of individuals, such as with respect to resources, routines and operating procedures, socio-psychological approaches focus primarily on conflict as

experienced. However, task and process conflict - as types - allow people to draw upon ways of calculating among alternative actions or solving problems.

March and Simon (1958, pp. 149-150) envisage distinct processes by which conflicts are addressed, as: problem-solving, persuasion, bargaining and politics, with the former two approaches requiring a stable relationship to be or mimic intra-organizational interaction, and the latter two being more common among autonomous organizations. Problem-solving also indicates a cognitive and factual approach, with persuasion involving a mobilization of common norms, shared knowledge or mental models. Furthermore, Cyert and March (1963, pp. 164-166) discuss the “quasi-resolution of conflict”, by means of local rationality, “acceptable-level decision rules”, and sequential decision-making. The local rationality expressed in these ideas is consistent with Jehn and Mannix’s finding of task conflict in teams and small groups, to which they attribute greater qualities of tolerating conflict, and of conflict being functional. This comparison has a bearing on our second and third research questions, of how conflicts are experienced, and how they can be managed, with a notable crossover as persuasion and open norms.

Highlighting some overlaps across the two approaches in business-to-business research, Mele (2011, p. 1378) favors an extended view of relational conflict, as ‘multifaceted phenomenon’ and a ‘core category for understanding the more generic phenomenon of conflicts and conflict resolution’ (ibid.). Similarly, Tähtinen and Blois (2011, p. 907) see relationships as a broader phenomenon where ‘conflicts are emotionally defined and perceived by a triggering event’. Song, Dyer and Thieme

(2006) argue that research into conflict has become characterized by ‘a conflict's dimensionality, complexity, and contingency’, something that Mele (2011) and Tähtinen and Blois (2011) recognize in their assessment of emotions, cognitions and relationships as dynamic dimensions rather than discrete types of conflict.

Revisiting the behavioral theories with the benefit of recent contributions to the study of conflict in social psychology encourages us to combine understandings which feature conflict as a pervasive condition, as experienced, and within which actors manage and cope. A particular conflict can be resolved, or at least negotiated, but we cannot expect that conflict to have a specific and unique corresponding antecedent, which itself can also be resolved. Rather, the process of organizing business activities draws with it conflicts, and organizing involves the provision of resources, operating procedures, or routines to manage at least some of these. With our third research question, we can expect, in Cyert and March’s (1992, p. 215) terms, ‘unresolved conflict’.

2.2 Conflict and IMP research

Business-to-business research has focused on conflicts in business practice and activity, as experienced or observed between organizations (Harrison, 2004). One would expect a tendency in this research towards tasks and processes (Jehn and Mannix, 2001; Greer, Jehn and Mannix, 2008), and towards bargaining and politics (March and Simon, 1958). We see this in studies of the conflict between sales and marketing personnel (Le Meunier-FitzHugh, Massey & Piercy, 2011; Chartered Institute of Marketing, 2011), suppliers and their customers in sustainable supply

networks, and those managing different marketing and distribution channels (Chang & Gotcher, 2010; Cheng & Sheu, 2012; Ndubisi, 2011; Plank, Newell & Reid, 2006; Plank & Newell, 2007; Webb & Lambe, 2007). In these settings, conflicts are generally seen as dysfunctional, and as being resolved through the identification of goals, their divergence, reasons for or antecedent of these divergences, and instruments of alignment – common with bargaining – as incentives, supported by senior managerial involvement. The entity at stake tends to be the direct value otherwise created by cross-functional interactions and exchanges (Lam & Chin, 2005).

Research on relationship-ending and recovery from an IMP perspective points to additional understandings of conflict and constructs to be mobilized. Relationships are essential to supporting complex exchanges and interactions, vulnerable to conflict, and with actors likely to experience conflict (Halinen & Tähtinen, 2002; Nordin, 2006; Vaaland & Håkansson, 2003; Harrison, 2004; Salo, Tähtinen & Ulkuniemi, 2009; Welch & Wilkinson; 2005). In IMP research the business relationship is a unit of analysis, identified through its value, longevity, accumulation of artifacts and practices, and interpersonal identities.

“Relationship” has multiple concurrent roles, which can be outlined following the actors-resources-activities framework (Håkansson & Johansson, 1992). It emerges through regular interactions among actors, be these people representing companies, groups within companies, or project groups drawing members from two or more companies. Relationships are ways of holding resources as long-lived assets or

inputs in place for business activities, as a form of informal governance, and a response to the understanding that resources emerge or take a specific shape through interactions between actors. Indeed, resources continue to develop and adapt, interacting with one another given some overall business plan (Finch, Wagner & Hynes, 2012; Corsaro, Cantù & Snehota, 2012). Following the resource interaction model (Håkansson & Waluszewski, 2002; Baraldi & Waluszewski, 2005), relationships, alongside business units, facilities and intermediate goods and services, can be considered as resources for business activities, and as means of acquiring and gaining influence over other resources. The understanding of resources in connection with relationships as developed within IMP research provides further impetus to our first research question, on the role of resources and relationships in conflicts.

The behavioral model of organization has influenced IMP research (Håkansson & Snehota, 2000; Brennan, 2006; Baraldi, et al., 2007). In turn, IMP researchers see resources in ways not fully developed in the behavioral approaches, as malleable, developed, and governed jointly as part of conflict and coalition. While recognizing inter-organizational issues, behavioral researchers concentrated on organizing within business firms. In addition, durable relationships are forms of organizing that support small groups, as with projects (Vaaland & Håkansson, 2003) and interpersonal trust, bonds and emotions (Ryan & Blois, 2010). The lesson from this review, not fully developed in business-to-business research, is that conflict is likely to be a pervasive condition of business activity, encompassing relationships and resources, experienced by actors as events in the course of their business activities or tasks.

3. Research Design

3.1 Drawing on the literature

In applying and developing the concepts discussed in Section 2 (above), we recognize that, while identifiable as constructs, some have meanings that are ambiguous or refer to processes that are likely to emerge over time. This influences our choice of comparative case study as a research design. Our analysis is situated in between different versions of conflict, of interest and as experienced and made sense of by actors with a view to managing or managing in these. We seek conflict empirically in this 'in between state' as a sequence of activities in managing, which can alter a business network by means of its relationships and resources. Furthermore, relationship, in mature industrial settings, can develop multiple and overlapping roles, as a resource for establishing and organizing exchanges and as a means to acquire new resources.

We begin by conceptualizing the business setting as different regimes or configurations of a network: normal business, conflicts of interests, and conflicts of adaptation. All three regimes occur simultaneously among the overlapping groups of companies, regulators and other organizations. In the case of oilfield chemistry, normal business has systemic qualities, which are identified, formalized and made stable by Chemical Management Service contracts and by the processes of regulation. Larger oil companies, with groups of production facilities (or assets), offer Chemical Management Service (CMS) contracts for four or five years, which oilfield chemists tender for. In one of our interviews, Malcolm, sales manager at

ProChemicals, describes:

> The driver has been from oil and gas companies to move towards longer-term contract as single sourcing or dual sourcing because they believe that they get better price by doing that. We certainly reduce the pricing to gain those longer-term contracts because it gets us bigger market share. If we don't win contracts, there will be no chance for us to have a business.

CMSs provide incentives for aligning the interests of oilfield chemists and oil companies in normal business. In part, they allow incumbent chemists to undertake product development, as a form of adaptation, enhanced by a greater familiarity with an oil company's production facilities. We are interested in conflicts of interest that emerge at or beyond the bounds of normal business.

Our cases are instance of cases within the case, allowing cross-case comparison (Eisenhardt, 1989; Ragin, 1992; Yin, 2009). We expect the construct of relationship to be a vital unit of analysis, made durable through being a means of combining resources and being a form of connection and governance over resources and their combination. Relationships show patterns and are means of connection through repeated and multiple interactions in the combination and mobilization of resources, rather than only concerning personal and social bonds. Similarly, resource, as a construct, refers to entities formed and made durable in connection with business plans for particular projects or activities, and are malleable in their interactions in

use.

Finally, we draw upon ideas about types of conflict, which are also broad categorizations of the ways in which actors make sense of conflicts as experienced, and prepare for managing or managing in these conflicts. Where Jehn and Mannix (2001) propose a typology of relational (or emotional or affective), task (cognitive, factual) and process conflict (norms-based), March and Simon (1958, pp. 149-150) had suggested broadly comparable categories of problem-solving (factual), persuasion (norm-based), bargaining and political ways of addressing conflict.

3.2 Identifying cases

Business as normal is disturbed occasionally through combinations of regulatory change, chemicals costs exceeding norms, and the presentation of novel technical problems at oil companies' production facilities (Geiger & Finch, 2009, 2011). These departures do not have ready-made products, services or organizing procedures to manage them. Rather, these tend to bring conflicts into experience and challenge established interests. For example, economies of scale are important to chemicals companies in producing near-commodity products (chemical bases), economies of re-use are important to oilfield chemists as a basis for incremental innovation in adapting established solutions, and flow-assurance and asset-integrity are vital to oil companies along with overall cost control across the clusters of assets that form business units. Regulators can require the withdrawal from use of particular chemicals though substitution orders, which can be disruptive, even with the two-year notice period. We identified conflicts as cases in the various disruptions to

normal business, which became subjects of managerial attention. In the absence of established ways of addressing breakdowns in normal business, we observed a number of ad hoc initiatives that featured different actors taking on the role of adaptive actor.

The literature review and our overview of the industry provides a basis in deciding what counts as a case (Gibbert, Ruigrok & Wicki, 2008; Dubois & Gibbert, 2010). We identified events that drew out conflicts of interests situated within business-to-business relationships. Conceptually, we expected the events to occupy ground in between conflicts of interest and conflicts as experienced by actors. We take resources to be fundamental in making relationships durable, interacting and requiring negotiated forms of governance. Events then qualify as of interest in being at or beyond the bounds of normal business, as anticipated for example in CMS agreements. Given the durability of resources and relationships, we expect conflicts to be characterized by a cluster or sequence of events. And given our understanding of the business setting, we expect conflicts to involve some combination of regulation, costs and technical challenge.

We adopt the approach of comparing multiple cases, taken to be a theoretical sample of conflicts understood as processes (Eisenhardt, 1989; Dubois & Gadde, 2002; Yin, 2009). We selected our sample of cases from a broader study of the supply, exchange and use of oilfield chemistry, guided by the idea of theoretical sampling (Glaser & Strauss, 1967; Suddabay, 2006). In Glaser's (1978) view, in theoretical sampling 'the analyst jointly collects, codes, and analyses his data and

decides which data to collect next and where to find them, in order to develop his theory as it emerges'. In developing the sample of cases, we sought instances of conflict becoming manifest – as events that interviewees could recall and discuss in common – in different areas of the network, for instance as research and development, business exchange, and regulation. These areas include chemicals suppliers, chemical service companies, oil companies, and regulators.

The cases qualify as such by providing instances that reflect the conceptual qualities discussed above (Sigglekow, 2007; Klag & Langley, 2013). Each captures a conflict of interest, drawn out as clusters, often series, of events as described by two or more interviewees from across the industry. They feature as a manifestation of a conflict of interest, and as a combination of novel solution, managing conflict and managing in conflict, a way of adapting that departs from normal business as recognized by interviewees. Each case provides multiple and overlapping perspectives on a conflict, allowing us to address our three research questions. We face limitations inherent in case study research of limited numbers of observations. However, we are assisted in a particularly focused form of theoretical generalization in that the cases are controlled in by a absence of the more dramatic conflicts associated with relationship ending and attendant a efforts at recovery. Rather, the cases allow us to focus on relationships between conflicts of interest and conflict as experienced in stable and mature business-to-business relationships.

3.3 Coding and analysis

As shown in Table 1, we gathered a dataset through a combination of research

interviews, observation, attending industry seminars and trade shows, and collating industry and company reports and documents. We began sampling cases from early 2011, identifying the five cases described above and in Table 1 from interviews and observations. Conflicts varied across these cases in terms of the participants in the relationship, the patterns of interaction, the duration of the task or project, and the ways in which these partially resolved. A notable feature of our research, which is in part attributed to our research approach, is in examining the connections and successions between cases, as well as comparing the cases' events ‘side-by-side’ or ‘cross-case’. We undertook and recorded twenty-one interviews, which included fifteen face-to-face interviews and the other six over Skype. As set out in Table 1, we transcribed and coded the interviews, observed their laboratories, companies, conferences, reviewed regulatory documents on green chemistry, industry newsletters, meeting minutes, covering CEFAS (www.cefas.defra.gov.uk/), REACH, OSPAR (www.ospar.org), and ECHA (www.echa.europa.eu).

[Please insert Table 1 about here]

Analyzing cases, by means of cross-case comparison, of conflicts established as consequence of interactions allowed us to develop an understanding of how conflict in our industrial setting were distributed in the industrial network, how they connect, characteristics of conflicts, and the way they are transformed into being more functional in the process of being resolved. We organized and analyzed our data by using QSR Nvivo, version 10. We captured cases (Eisenhardt, 1989) from our empirical database, each of which showed similar practical dimensions that we draw

upon in presenting findings in Section 4 (below). We coded the transcriptions and recordings by proposing common nodes in the data relating to the manifestations of selected cases (in Table 1). We then examined the cases among the actors and actors' relations, in the activities of product development and marketing, project and tasks, and impact of environmental regulation. Our common unit of analysis referred to the relationships in which the conflicts became manifest. However, the boundaries of these units proved blurred and unstable empirically, in part through our expectation that conflicts of interests would be important, and in part through the ways in which actors managed the conflicts by changing the nature of tasks over time. Given the multiple qualities of conflict as identified in the literature review, we anticipate that comparing case studies offers a way of organizing and analyzing our dataset especially in identifying qualities that cross cases (Järvensivu & Törnroos, 2010).

4. Findings

Our cases of conflict include: (1) An oilfield chemistry company encountering environmental regulation; (2) A chemicals company undertaking product development inhibited by regulations that differ across countries; (3) An oilfield chemistry company requiring the technical capabilities by its chemicals supplier in order to resolve a technical problem for its oil-company customer; (4) An oilfield chemistry company undertaking product development ahead of an established user requirement; and (5) A chemicals company seeking a way of achieving coordination with users and economies of scale in product development. We summarize our findings in Table 2.

[Please insert Table 2 about here]

4.1 Comparing the cases

Case 1 is a case of a change in regulation uncovering conflicts of interest, a sequence of technical changes led by a chemicals company, and drawing an oilfield chemistry company into multiple conflicts. It shows how oilfield chemists, in adapting to regulators' requirements, face multiple conflicts simultaneously, and develop a combination of bargaining with customers regarding tasks and projects, lobbying regulators over processes and technical incremental innovation. NAWO, a chemicals company, produces a demulsifier as a commodity product, sold in different markets, including oilfield chemistry for the oil and gas industry. This usually requires little adaptation, and oilfield chemists order and apply the product on behalf of their oil-company customers and monitor its use. The demulsifier became subject to a substitution order through the regulatory process of OSPAR. Tony, NAWO's product manager, set out the themes of conflict:

> The demulsifier ... is presumed to be endocrine disrupting, despite the lack of a good body of scientific evidence to support this. This has meant that less efficient demulsifiers are used and can lead to difficulties with oil and water separation and the discharge of oil above regulatory limits into the marine environment ....

At the same time the REACH regulations brought the chemical under additional

scrutiny. The chemicals company changed the formulation of the demulsifier so that it satisfied the OSPAR's revised regulatory standards. The conflict arose in a material sense as the new demulsifier interacted with ProChemicals's (oilfield chemist's) proprietary scale and corrosion treatment, which in line with the industry's usual business practice had been adapted for an oil company (Large Oil), given its unique problem of scaling on a particular production facility. The interaction of different chemical treatments is well-known and makes oil companies risk-averse to proposals for changing out individual chemical treatments, in case of adverse interactions among other established treatments. In this case, the oilfield chemist, ProChemicals, absorbed the conflict, needing to develop another proprietary treatment to fit in with NAWO's now regulatory-compliant commodity demulsifier. David, ProChemicals's oilfield chemist, discussed the need in this case to bargain with his counterpart at Large Oil:

> We will negotiate with our customers and they will understand. To be honest, due to the poor performance of [the base chemical], larger dose rates have to be used. Therefore, in looking at risk, they may be equivalent or even more hazardous as less environmentally acceptable products. Innovation never stops. We will continually establish research projects for better performing products coping with updated regulations.

The conflict continued to develop. The EU's REACH regulation requires chemicals suppliers - NAWO and ProChemicals - to disclose the formulation of chemicals products. Keith, from REACH, presented the progress and the benefits of REACH at

a meeting of the UK Chemical Stakeholders Forum in February 2013:

> There are 2892 substances to be registered in June 2013 for the next deadline. Our aim is to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances. Meanwhile, we are hoping to manage risks from chemicals through providing safety information on the substances, such as Safety Data Sheets. If you do not register your substances, then the data on them will not be available and as a result you will no longer be able to manufacture or supply them legally, i.e. no data, no market.

For NAWO, its new demulsifier remained a near-commodity produced at large scale. For ProChemicals, its scale and corrosion treatment was a specialist formulation of proprietary value, capturing in material form its specialist service offered to oil companies. ProChemicals supplied both products to Large Oil under the terms of a CMS contract, earning a small mark-up on the demulsifier, and charging an additional developmental mark-up for the proprietary scale and corrosions treatment. ProChemicals undertook further developmental work, adapting its scale and corrosion treatment for Large Oil so that it was compatible with the new emulsifier. It made additional resources available in order to make the CMS and its underlying relationship with Large Oil work effectively. It also had to bargain with Large Oil in terms of recovering some of the additional developmental costs for the scale and corrosion treatment, while also making the case for adopting NAWO's new - regulation-compliant - demulsifier. Both NAWO and ProChemicals had indirect ways

of lobbying the two regulatory processes, but these were in terms of overall processes, with little practical bearing on the two chemical treatments in this case.

Case 2 also raises the question of which actor should adapt. The case emerges from a question of regulation, but surprisingly the chemicals company, KTI, bore the adaptation, leaving the oilfield chemistry company and oil company relatively unaffected. The case shows how norms can be mobilized in an industry against long-term business trends. Despite OSPAR having achieved a high degree of harmonization across its signatory countries, Norway has in many instances adopted standards that accept lower levels of bio-accumulation, persistence and toxicity. This is frustrating for chemicals companies as it is in conflict with a business model based on economies of scale in production and distribution. It can lead to conflicts between oilfield chemists and oil companies, both of which accept the need for adaptions in chemical treatments, but raises suspicions of adaptations leading to higher costs. In this case, an oilfield chemist at ChemSolve proposed a biocide treatment used successfully elsewhere in the North Sea as a treatment for use in the Norwegian sector for its customer Cold Oil, and the biocide did not achieve the regulatory standards. Tao, KTI's marketing manager, explains:

> We use [the biocide] for formulations, which are used in many applications for problems of microbiological contamination. They have extensive use in enhanced oil recovery, in injection water systems, topside recovery systems, pipeline protection and storage. We are facing a problem that such a well-performing product cannot be used in Norway

There are strong resource and material bases in this case. ChemSolve recommended KTI's biocide treatment, which protects gas production against microbial infection (or 'souring'), with the formulation to be applied being close to KTI's base chemical. The Norwegian industry is also developing, with activities moving close to the Arctic Circle, which represents greater environmental sensitivity. A norm of sorts is established in the Norwegian sector, of chemicals companies, oilfield chemists and oil companies accepting greater environmental sensitivity and the associated higher costs, supported by the industry-wide understanding of the long-term growth prospects and technical challenges that lie ahead. In this case, KTI provided additional resources even with limited current prospects for benefitting from economies of scale in producing a version of the biocide for the Norwegian sector. It could in principle be used elsewhere. In contrast to Case 1, there is little additional activity around the regulatory network, of making broadly political representation to OSPAR in support of approaching closer harmonization.

Case 3 is primarily a technology case, of GD Solutions - an oilfield chemist - requiring being more innovative than in its usual adaptive business model in order to solve a long-standing problem for Mature Oil. The case shows how a chemicals company and an oilfield chemist required ad hoc organizing to resolve an oil company's technical problem quickly. The problem was of deliquidification of a gas reservoir and a technique has become established, of foam-assisted lifting. Monjit, GD Solutions' R&D manager, discussed the technical problem, which began in a straightforward manner:

> It was caused by a loss in reservoir pressure of long-term use of gas wells. We turned to our suppliers to order products in solving the problem. What we chose was a chemical treatment known as Foam Assisted Lift (FAL).

However, gas reservoirs and their associated production facilities present unique chemical regimes to oilfield chemists, which is why these companies specialize in adaptation. In Case 3, the problem required greater collaboration between GD Solutions, FAL Specialist (its chemicals supplier) and Mature Oil, a little more innovative effort - not radical innovation, as the technique was established - and greater commitment from Mature Oil in allowing field trials and gathering of more extensive data as GD Solutions deployed the treatment. Time became crucial with the deliquidification problem being resolved by the GD Solutions recruiting additional assistance from FAL Specialist in a project group. The case is an instance of additional technical resources being acquired by extending a network and altering the nature of exchanges therein. GD Solutions encountered a conflict with Mature Oil in terms of the timing of its solution to secure flow-assurance in production, with GD Solution's reputation in its normal adaptive role being at stake. In resolving the case by developing a distinct project, it required the cost of additional resources in the project and the limited collaboration of Mature Oil in taking an interest in the incremental innovation in allowing field trials and additional gathering of data at trials with additional monitoring in use.

Case 4 also captures the adaption role of oilfield chemists, of undertaking incremental innovation on behalf of their oil company customers. It shows how resources can be shaped organizationally rather than technically, and how development projects can be effective in marketing and lobbying as well as resolving technical questions. Unlike with Case 3, the required incremental innovation did not fit into the CMS contract. Rather, MIC Chemicals (oilfield chemist) perceived a need from its understanding across a number of facilities and participating in regulatory and applied chemistry workshops. But its chemists could not justify using the company's lab for a speculative activity, in establishing a product type ahead of customer requirements and outside the requirements of any CMS contract. The arbitrage of oilfield chemists is clear, between buying from chemistry companies and supplying solutions to oil companies, but this also requires investment in applied chemistry techniques and expertise, and ways of demonstrating these to potential customers. This way of being innovative and demonstrating one's capacity to be innovative has no clear resource base prior to or unrelated to a CMS contract. MIC Chemicals' oilfield chemists were able to participate in a joint-industry project, run as a club by the chemical engineering department of a University. This specific investment was to be part of a project group, with over 20 members among chemistry, oilfield chemistry and oil companies, that ran programs over three years to be agreed across the membership, and reported on a six-monthly basis. The programme aimed to accelerate the application of research, and the broad membership allowed oilfield chemists to meet with their suppliers and customers, demonstrating their commitment to incremental innovation.

Case 5 features some of the qualities found in Cases 1 and 2, in that a chemicals company, SurChem, becomes involved in adaptive activities. SurChem responded to the trend in regulation by embracing what is termed in the industry as green chemistry. The case addresses overlapping conflicts of interest, across cost, regulation and technology, which together formulate around the bounds of adaptation. Conflicts of interest surround green chemistry as oilfield chemists encounter resistance from chemicals companies in investing in new chemical bases specifically for the upstream petroleum industry. In broad terms, such investments do not offer economies of scale and can appear unattractive to chemicals companies. Rather than responding to oilfield chemists on a piece-meal basis, SurChem developed an approach that tried to capture economies of scale by developing and marketing a range of regulation-compliant - or green - chemicals. Claire works as SurChem's product manager, and described the process of developing 'green chemistry kits':

> We made around twenty products, named 'green chemical kits', tested them to make sure they work with the satisfactory lab performance, at least better than our existing products. We then came out with a range of seven products. ... We had all the seven products tested 'yellow' under the Norwegian regulations, so they proved available to sell in the North Sea. I contacted our customer companies to have them tested for application in real field sites under a non-disclosure agreement and they provided a feedback performance report to us. After that, we found one with the best performance and comparable price, then put it into

production based on our evaluation and our customer's report.

SurChem anticipated the adaptive requirements of the oilfield chemists and the requirements for improved performance among oil companies for green chemistry. It marketed in beta-version 'packs' of seven green chemicals, ready for field trials at oil companies' facilities, as arranged by oilfield chemists. Recognizing too that oil companies are risk averse, SurChem organized tests and trials at independent labs for regulatory compliance and for the effectiveness of the products.

4.2 Answering the research questions

We illustrate our answers to the research questions in Figure 1 (below). It shows generally a process in which actors experience conflicts of interest as specific events, as captured in the five cases presented above. Actors combine ways on interpreting and acting upon the conflicts, as sequences of events, reconfiguring resources in the business network.

[Please insert Figure 1 about here]

4.2.1 How do actors draw resources into their relationships during conflict?

In all cases, the conflicts were experienced because they were associated with activities that were not anticipated by normal business. In normal business, oilfield chemists act as adaptive agents, acquiring chemical bases from chemicals companies and applying these through a combination of service and proprietary product for their oil-company customers. In the five cases, additional non-standard

adaptations were accompanied by business cases that fitted closely with at least one actor's interests, and with norms developed in relationships as to the overall value of oilfield chemistry, and professionalism of chemists. Chemicals companies do not usually make products only for the oil and gas industry as they cannot achieve economies of scale. Case 5 shows a way in which the conditions for economies of scale were at least approximated. Case 1 shows the chemicals company confronted with a fate accompli, through regulation, and Case 2 fits with the norms of the expanding Norwegian sector. Similarly, oilfield chemists normally undertake adaptation but within the provisions of a CMS. Case 4 shows oilfield chemists seeking additional lab capacity, as theirs was committed to contracted work, adapting current products to user needs and not developing new products ahead of need. Relationships across all parties were strengthened in Cases 2, 4 and 5 as different ways of undertaking product development were arranged. Case 1 shows relationships placed under strain, although the commercial actors could point to regulation as the cause.

4.2.2 How do actors experience and make sense of conflict as part of their business activities?

In answering this question, we set out and draw upon the mature organizational conditions of the oilfield chemistry sector, as it serves the oil industry. Controversies and conflicts emerged relatively slowly and departures from normal activities were assessed against those normal roles and activities. Hence, in the three cases (Cases 1, 2 and 5) in which chemical companies undertook product development, judgments as to economies of scale remain pertinent. Oilfield chemists remain

specialists in adaptation, with their labs being dedicated to supporting adaptation work, of adjusting and testing chemical treatments rather than development new chemical bases. Oil companies remain concerned with asset integrity and flow assurance across their production facilities. While we observed emotion and affect with conflict, these had little consequence in terms of threats of relationship ending. Rather, conflicts of interest and conflict as experienced featured novel and adaptive tasks, problem-solving and processes for organizing those tasks. Norms were prominent in Cases 2 and 4, bargaining was prominent in Cases 1, 3 and 5. Lobbying had some role in Case 1 and was implied in Case 2. In all cases the actor that took on the role of lead adaptive agent demonstrated its capacity in applied science, in mobilizing its lab and expertise, but required a means of persuasion in drawing on additional resources, be these from within its own organization, or drawn in from other organizations.

4.2.3 How do actors manage conflict in relationships?

Process – in Jehn and Mannix's (2001) sense of ways of allocating resources to tasks – was important in allowing an actor to become an adaptive agent with respect to a particular conflict. In all cases, the actor taking on the role as leading adaptive agent required additional resources and a means of persuading others to make those resources available for that ad hoc adaptive activity. Cases 1 and 2 were consistent with the behavioral approach, of the oilfield chemist having to make resources available internally, from what would otherwise be 'organizational slack'. In Case 1, the oilfield chemist had to justify to the customer as to why, following regulation, the new demulsifier supplied in base form by the chemicals company

showed lower levels of performance and why a new scale and corrosion treatment was also required. In this sense, the oil company also contributed further resource. In Cases 3, 4 and 5, the lead adaptive agent acquired resources from elsewhere in the industry, expanding the network around specific ad hoc projects. In all cases, the process of acquiring additional resources combined commercial compensation (a combination of problem-solving and bargaining) and appeals to norms and politics. These required a thorough and mature knowledge of the potential resources available in an industry, amenable to becoming part of a network, including a university-led applied research program, and willingness of oil companies to participate in field trials and to provide additional feedback on the performance of products in beta version.

5. Discussion

5.1 Relationships are made durable and valuable

The mature circumstances of the industry provide an unusual setting to understand how resources and relationships interact, allowing actors to manage conflicts of interest as these become experienced in adaptive events. Relationship-ending forms part of the CMS agreements between oil companies and oilfield chemists, but oil companies, oilfield chemists and chemistry companies, as well as regulators, independent labs and university research groups, form a stable and well-connected network featuring personal and social bonds and professional associations as well as commercial relationships. Instead, relationships become durable and valuable, in some instances over 30 years, by providing a basis for a system of normal business and in allowing actors to take on the role of lead adaptive actor for ad hoc projects.

In the cases of conflict, relationships provide grounding for norms and some instances of lobbying through industry associations and professional societies, as ad hoc processes of adapting, as these are not anticipated by pre-negotiated CMSs or norms in contracting for the supply of base chemicals. In support of Håkansson & Waluszewski (2002), relationships became a resource in allowing adaptive agents to acquire the use of additional resources or different uses of established resources.

To date, more has been made in the behavioral literature of actors' bounded cognition in making decisions, and the malleability of their aspiration levels in anticipating consequences or outcomes of business activities (March, 1999; Håkansson & Waluszewski, 2002). Following Jehn and Mannix (2001), actors could manage many problems without recourse to experiences of conflict through task management, through the shared cognitive resources afforded by applied chemistry and as anticipated in CMS agreements and in the configurations of Oilfield Chemists' labs. Where actors experienced conflict, it was in cases where the normal business practices, including the specialism in adaptation, exceeded the usual array of tasks and the attendant configuration of resources in these tightly defined nets of actors, could not cope.

5.2 Agents format rather than resolve conflicts

Incremental innovation as product development is the dominant form of adaptation in normal business. The five cases presented in Section 4 (above) imply these norms by being situated at or beyond the bounds normal business, requiring ad hoc adaptation in the face of conflict. Action is required, but the process of justifying

action is part of normal business. We see instances of task and process in all five cases (Jehn & Mannix, 2001), but these are also instances of problem-solving, persuasion and norms, bargaining and politics, as suggested by March and Simon (1958). The sequence of events as actors come to experience and make sense of conflicts is significant. Sequence implies that actors interpret and pass on a conflict, through combining tasks and a process. But as seen clearly in Case 1, and to an extent in Cases 4 and 5, managers distribute and format conflicts and do not guarantee a resolution. Events are important in bringing action, dynamism and specificity to a conflict, but sequence is important too, which can be elaborate as we have little expectation of a clear-cut resolution.

We can question how antecedent and consequent has been theorized in conflict research. At the very least, this introduces a bias in conflict to feature 'as experienced' and to affect, emotion or in Jehn and Mannix's (2001) typology, relationship. We found little evidence of the conflicts being played out in terms of emotions and critical threats to the continuation of business relationships (Halinen & Tähtinen, 2002; Mele, 2011; Ryan & Blois, 2010; Salo, Tähtinen & Ulkuniemi, 2009). In terms of Jehn and Mannix's (2001) typology, we saw a greater concentration on process conflict, of how to re-organize task or introduce new tasks, involving a change in roles of one or more established actor, or the recruitment of actors to a task. We observed emotional responses in meetings, and interviewees recounted these in relation to experiments and field trials that had not gone well. But actors were working in a setting of multiple and durable relationships, in connection with long-lived production facilities and with a proportion of business being tied in to

medium-term contracts (Nordin, 2006). Tasks can augment relationships and resources, akin to a standard operating procedure or multi-partner project (Mele, 2011; Vaaland & Håkansson, 2003), as are processes for organizing tasks (Nelson & Winter, 1982). The cases draw attention not only to conflicts of interest, in providing focused circumstances for conflicts as experienced by business actors, but ways in which we can understand how relationships are maintained in the face of conflicts as these feature ways of re-arranging tasks.

5.3 Conflicts configure networks

Bargaining and the ending of relationships have been strong features in established research into conflict (Harrison, 2004; Salo, Tähtinen & Ulkuniemi, 2009; Ryan & Blois, 2010; Tähtinen & Blois, 2011). In our setting of a network with a small number of actors it is hard to escape or end relationships. Indeed, ending a relationship commercially does not mean that the company or key personnel will go away. That company will still supply some chemistry products as a third party, and personnel will still meet at industry conferences. On the other hand, the network of oilfield chemistry features resources that can be made available for extending or transforming tasks in response to conflicts. These resources include labs, common interests in the relationships between oilfield chemists and oil companies, industry associations and conferences providing regular meeting spaces around technical questions in applied chemistry. The problems encountered at oil companies' production facilities are heterogeneous, but oilfield chemists have acquired a high degree of accumulated experience in coping with these varied tasks. The shared expertise in chemistry also allows networks to be extended and adjusted among

chemicals, oilfield chemistry and oil companies, as partial resolutions focus on technical and analytical questions. The question of environmental hazard is a source of conflict, but OSPAR's response to this, while causing frustration, also narrows the scope of argument, focusing on measurable levels set for maximum acceptable hazards defined in standard tests.

6. Conclusion

We conclude that actors experience conflicts in durable relationships and resources. Business as normal often satisfies actors' aspirations for product and service performance, as a system, as a set of durable relationships, as operating procedures, routines and perhaps truces. However, these valuable and useful entities and artifacts are vulnerable to the adaptive pressures of enhanced regulation, new business plans and difficult technical challenges at oil companies' production facilities. Research into conflict has featured actors' emotions and relationship-ending, but we suggest that the resource-dimension of conflicts draws attention to durability, showing it as a pervasive condition. Conflict can develop relatively slowly as experienced by actors, threatening relationships as these also acquire value to two or more parties as a resource and as a way of managing and gaining value from a set of resources.

This leads to a second conclusion that relationships are valuable not only as a set of practices and norms that make repeated exchanges easier, for instance at lower governance cost, with greater developing trust, and make mutual adaptions of resources easier. Rather, in cases of adaptation, relationships enabled actors to

reconfigure their resources, for instance in providing a test site, providing additional test data, seeking mutual interest in some lobbying activities, and in accepting technical data in applied chemistry as a basis for bargaining. Resources can play a role in conflict research analogous to 'antecedents' in current conflicts research. However, a resolution will not necessarily address that pervasive conflict of interest, and the pervasiveness of a conflict of interest contributes to the partial or intermittent resolution of conflict as experienced in managerial practice.

In terms of managerial implications, these reinforce and help us reflect further on our conceptual contribution. The industry setting of oilfield chemistry is mature, in terms of small numbers of actors, production facilities, geological conditions, chemical regimes and regulation. Our findings are conditioned by the setting of oilfield chemistry, providing insights into a middle ground between conflicts of interest and conflicts as experienced, with there being few dramatic turns to relationship ending and attendant relationship recovery. Empirically, and drawing from managerial practice, we identified three overlapping regimes, of normal business, ad hoc adaptation, and managing in conflict. The first has systemic qualities, whereas the second and third implied processes arranged around incremental innovation, requiring that managers devise tasks and processes, and manage the overlaps across regimes. Adaptive tasks within normal business provide a benchmark for our analysis, not leading to conflicts as experienced by managers, and being anticipated as tasks and processes in contracts. CMS contracts between oilfield chemists and oil companies are important in capturing and making stable normal business,

performed mainly by oilfield chemists in their normal specialist role as adaptive agents.

Actors experience conflicts of interest in cases where adaptations are not anticipated in normal business processes. These occur occasionally, for example, led by regulators making substitution orders to withdraw particular chemicals, actors - typically oil companies - becoming sensitive to costs or performance, and oil companies presenting novel problems or combinations of problems in the chemicals regime and treatment of their production facilities. These problems might involve innovative chemistry, but this is not usually the decisive factor. Rather it is the way of organizing the incremental innovation, the need work faster then a normal, and the need to instigate rapid data acquisition and testing.

Relationship-ending is rare, and relationships rarely reach crises that require substantial recovery strategies. Processes of industrial concentration among chemicals and oilfield chemistry companies have accompanied the mature state of the industry. CMSs add considerable stability for their four or five-year terms, so end and are re-tendered, but this is not synonymous with relationship ending. Even where an oilfield chemistry company has a CMS with an oil company, it will supply a proposition of treatments from other oilfield chemistry companies as well a s from chemical companies, and CMS contracts commonly make provision for oil companies to buy 'best in class' even if this is not from the CMS contractor. In other words, the relationships are multi-dimensional, people establish strong bonds even when moving between companies, and business development and sales personnel

remain in contact with companies that they are not currently selling to or buying from. Instead, in these ad hoc adaptive cases, an actor needs to become the lead adaptive agent where there interests are especially germane, and as we have seen in the cases it is not always the oilfield chemist - who specializes in the analogous role for normal business.

The hallmark of managerial work in being adaptive in the ad hoc cases involves intervening in the network organization or resources, including relationships as resources, acquiring and reconnecting these, often for defined and relatively short periods of time (a matter of months). The managerial challenge is in adaption to persuade others of benefits exceeding costs, and of recruiting them to undertake different activities, such as participate in more data-intensive field trials. These look like ways of organizing to solve problems, but require additional reference to industry norms, perhaps bargaining and political activity - for instance in lobbying regulators.

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Table 1, Fieldwork log

Date	Type	Place or Job title	Organization	Duration (min)	Purpose
04/01/2011	Interview	Product Stewardship Manager	ProChemicals (Case 1)	90	Meeting on impact of REACH registration
04/01/2011	Interview	Executive Secretary	Industry association (all cases)	90	Meeting, role of industrial association interacting with regulators, innovation
04/01/2011	Observation	Oilfield chemist	ProChemicals (Case 1)	40	Overview of a service company environment and lab
10/05/2012	Interview	Consultant	Independent (all cases)	180	Overview of the industrial organization, regulation and product develop
14/05/2012	Interview	Sustainability Manager	KTI Chemicals (Case 2)	100	REACH registration, technology innovation
15/05/2012	Interview	Managing Director	GD Solutions (Case 3)	140	Tendering process, R&D
13/06/2012	Interview	Consultant	Independent (Case 2)	150	Industrial collaboration, innovation, national regulation differences
12/07/2012	Interview	Chemist	University (Case 4)	75	R&D, technology investment
12/07/2012	Observation	Lab	University (Case 4)	150	R&D, invest in facilities
13/07/2012	Interview	Product Manager	NAWO Chemicals (Case 1)	40	R&D project

23/07/2012	Interview	Marketing Manager	KTI Chemicals (Case 2)	50	Customers relationships, tendering
30/07/2012	Interview	R&D Manager	GD Solutions (Case 3)	60	R&D, technology investment
09/08/2012	Interview	Product Manager	SurChem (Case 5)	100	Regulatory testing, OSPAR
09/08/2012	Observation	Lab	SL Offshore Solutions	40	Facilities, R&D
10/08/2012	Interview	Sales Manager	ProChemicals (Case 1)	70	Customer relationships
16/08/2012	Interview	Chemist	ProChemicals (Case 1)	90	R&D project
22/08/2012	Interview	Integrity Management Specialist	KTI Chemicals (Case 2)	40	Regional regulation, marketing strategy
30/08/2012	Interview	Product Manager	ProChemicals (Case 1)	45	R&D, regulation
02/09/2012	Interview	Senior Drilling Advisor	SL Offshore Solutions (Case 4)	40	Technology management
27/09/2012	Interview	Sales	NAWO Chemicals (Case 1)	45	Customers relationship management, contracting
05/10/2012	Interview	Product manager	SL Offshore Solutions (Case 4)	40	Innovation
15/10/2012	Interview	General Manager	NAWO Chemicals (Case 1)	50	R&D investment
13/11/2012	Interview	UK Business Manager	KTI Chemicals (Case 2)	30	Relationship maintenance

27/11/2012	Interview	Production manager	MIC Chemicals (Case 3)	60	Industrial collaboration
05/02/2013	Observation	Chemical Stakeholders Forum	DEFRA, REACH (Cases 1 and 5)	420	Stakeholders' interaction with government

Table 2, Cross-case comparison

Case Summary	Actors	Resources	Management activities
Case 1: Chemicals supplier modifies its demulsifier to be regulation-compliant under OSPAR. Oilfield Chemist modifies scale and corrosion treatment, adapting to Chemical company's modified demulsifier. Oil company aware of inferior performance across chemical treatments as administered by Oilfield Chemist, now compliant with regulation. Oilfield Chemist concerned about disclosing formulation for proprietary scale and corrosion treatment under REACH	NAWO (Chemicals Company), ProChemicals (Oilfield Chemist), Large Oil (Oil Company), OSPAR and REACH (regulators)	• Regulation standards, testing, licensing and product registration processes • Labs of NAWO and ProChemicals • CMS contract between ProChemicals and Large Oil • Trading relationship between NAWO and ProChemicals • NAWO's demulsifier • ProChemical's scale and corrosion treatment	• NAWO markets its new demulsifier to all Oilfield Chemists in North Sea region • ProChemicals adapts by modifying its scale and corrosion treatment • ProChemicals and LargeOil bargain, within scope of the CMS contract, over costs of product development & reduced performance of regulatory-compliant treatments • Lobbying OSPAR & REACH through Industry Association and at UK Chemical Stakeholders' Forum
Case 2: Oilfield Services and Oil Companies require a biocide, compliant with Norwegian regulations. Norwegian regulations within OSPAR, but set at higher levels of environmental sensitivity. Chemicals company bears burden of adaptation	KTI Chemicals, ChemSolve, ColdOil, Norwegian testing agencies, within OSPAR	• Norwegian testing standards and licensing procedure • KTI's labs • Triadic relationship between KTI, ChemSolve and ColdOil • ColdOil's production facility	• Chemical company developed an adapted solution for use in the Norwegian sector of the North Sea. Frustrating of economies of scale, but respecting long-standing relationships and growth prospects in that sector. • Costs passed to ChemSolve and ColdOil, limited lobbying

			of regulator
Case 3: Oil Company experiences unexpected complications in deliquification at gas field, requires flow-assurance. Problem is beyond bounds of CMS agreement of Oilfield Service and Oil companies. Technical solution enhanced and accelerated by contracting chemicals company in to a special project	GD Solutions (Oilfield Services Company), FALSpecialist (Chemicals Company), MatureOil (Oil Company)	• CMS contract • Relationship of FALSpecialist and GD Solutions • Labs of FALSpecialist and GD Solutions • MatureOil's production facility	• MatureOil and GD Solutions allow extension to CMS for short development project to develop and adapt a technical solution for MatureOil. • Additional costs to ensure the continuation of production, cost-based trade-off and bargaining among MatureOil, GD Solutions and, through additional tended for project FALSpecialist
Case 4: Oilfield Services company develops technical capability in advance of demand, and for the market per se. Innovation project is speculative, medium-term and beyond current CMS agreements, cannot justify devoting own lab space.	MIC Chemicals, Other market participants, chemicals companies, other oilfield companies and oil companies, University group undertaking applied research, funded by a club of market participants	• Lab space dedicated to medium-term projects and capabilities • University-led club allows market requirements to be articulated • Non-disclosure agreements, norms of the work programme	• University-led club allows broad and narrow networking and assurance that participants are acquiring new capabilities • Allows applied chemists to specialize in solving current problems within CMSs, and working on medium-projects so shaping market demand.
Case 5: Enhanced regulation and additional technical problems for the industry	SurChem (Chemicals Company), number of oilfield chemistry	• SurChem's relationships with Oilfield Chemistry	• Green chemistry marketed as composite packs of solutions

working with mature facilities places increasing demands on chemicals companies to develop effective 'green chemistry'. Chemicals companies usually unwilling to invest in innovations for their oilfield services markets, but develops a coordinated approach to gain market share and scale.	companies and their oil company clients, independent labs, undertaking tests using UK and Norwegian standards	companies • Oilfield Chemistry companies' relationships with their oil company customers • SurChem's labs • Independent labs • Norwegian environmental standards • Non-disclosure agreements	• Persuasion for risk-averse end users through comprehensive test data • Bargaining with Oilfield Chemists and Oil Companies to undertake field trials, and provide richer feedback on early commercial uses

Figure 1: Managing in conflicts